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Operating regulations to govern coal-mining...

Washington

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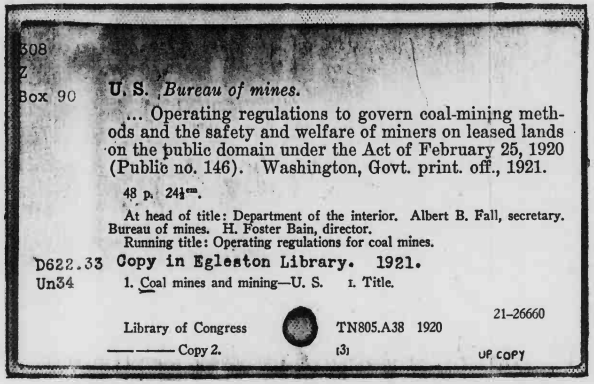

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DEPARTMENT OF THE INTERIOR
ALBERT B. FALL, SECRETARY
BUREAU OF MINES
H. FOSTER BAIN, DIRECTOR

OPERATING REGULATIONS

TO GOVERN COAL-MINING METHODS AND THE SAFETY AND WELFARE OF MINERS ON LEASED LANDS ON THE PUBLIC DOMAIN

UNDER THE ACT OF FEBRUARY 25, 1920
(PUBLIC No. 146)

WASHINGTON
GOVERNMENT PRINTING OFFICE
1921

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OPERATING REGULATIONS TO GOVERN COAL-MINING METHODS AND THE SAFETY AND WELFARE OF MINERS ON LEASED LANDS ON THE PUBLIC DOMAIN.

Under the act of Congress approved February 25, 1920. (Public No. 146—66th Congress.)

DEFINITIONS.

The following expressions wherever used in these regulations shall have the meaning now designated, viz:

Mining supervisor.—The agent appointed by and acting for the Secretary of the Interior to supervise all the coal-mining operations under these regulations.

District mining supervisor.—An agent appointed by the Secretary of the Interior to supervise coal-mining operations in one or more of the coal fields of the United States, acting under the direction of the mining supervisor.

Deputy mining supervisor.—An agent appointed by the Secretary of the Interior to supervise specific coal-mining operations, acting under the direction of the mining supervisor or district mining supervisor.

Lessee.—Any person or persons, partnership, association, firm, corporation, municipality, or State to whom a coal-mining lease, permit, or license is issued under the act of February 25, 1920.

Leased land.—The term "coal land," coal deposit," or "leased tract" shall mean any land or deposit owned by the United States, outside of Alaska, under lease, permit, or license in accordance with the act of February 25, 1920, for the purpose of mining coal therefrom.

Coal.—The term "coal" shall include lignite, subbituminous, cannel, bituminous, semibituminous, semianthracite, and anthracite.

Face.—The term "face" shall mean the advancing breast of a working place, of an entry, room, or slope.

Mine.—The term "mine" shall mean an underground excavation and development with shafts, slopes, drifts, or tunnels for the extraction of coal with hoisting or haulage equipment and appliances for the extraction of coal, and shall embrace any and all parts of the leased land or property and mining plant, on the surface and underground, that contribute directly or indirectly to the mining or handling of coal. Said excavation may be in one or several beds of coal, provided the hoisting or haulage is through an opening or openings to the surface used in common.

Stripping operation.—The term "stripping" or "stripping operation" shall mean a mining excavation or development by means of a surface pit or quarry, in which the surface or cover over the coal bed is first removed and the coal itself is excavated by scrapers, shovels, or other mechanical appliances, or by hand tools with or without preliminary blasting.

Slope.—The term "slope" shall mean an inclined entry in a dipping coal bed or an inclined tunnel to a coal bed, the average inclination of which is less than 45° from the horizontal.

Shaft.—The term "shaft," when unmodified, shall mean an opening, the axis of which is approximately vertical, extending from the surface to a coal deposit; also an underground shaft between two or more levels.

Inclined shaft.—The term "inclined shaft" shall mean a shaft which is inclined from the horizontal more than 45°.

Drift.—The term "drift" shall mean a horizontal passageway, level, or gangway, driven from the surface outcrop in the coal bed.

Tunnel.—The term "tunnel" shall mean a level or inclined passageway that is mainly in barren strata and which may or may not extend to the surface.

Room.—The term "room" shall mean a wide working place turned off an entry, slope, or level.

Working place.—The term "working place" shall mean a room, breast, entry, pillar, or place where coal is being mined or extracted and where one or more miners per working shift of the mine are regularly employed until the place is finished or stopped.

Panel.—The term "panel" shall mean a unit area in a system of mining by which the mine is divided into large rectangles or panels isolated or surrounded by solid pillars of coal into which pairs of entries are driven for the development of rooms and the extraction of pillars.

Entry.—The term "entry" shall mean a passageway in a coal bed that is approximately level and is used for haulage, traveling way, or ventilation. In a dipping bed, entries on the strike are known as "levels" or "gangways," and to the dip are known as "slopes."

Crosscut.—The term "crosscut" shall mean a passage driven to connect adjacent parallel entries or rooms. The term is synonymous with "cut-through"; and between rooms, where driven wide, is synonymous with "break-through."

Rock dusting.—The term "rock dusting," "shale dusting," or "stone dusting" shall mean to distribute or apply within passageways fine rock or shale dust in such a manner as to prevent, check, control, or extinguish coal-dust explosions as described in the publications of the United States Bureau of Mines on coal-dust explosions

Rock-dust barriers.—The term "rock-dust barrier" shall mean a large quantity of dry rock dust placed on such mechanically operated shelves or containers of design tested and approved by the Bureau of Mines and so located in a mine passageway that the pioneering wave of an explosion will automatically cause the dust to be thrown into suspension and extinguish the flame, thus limiting the explosion.

Gas.—The term "gas" in these regulations is used in the sense employed by coal miners to mean "fire damp," or an inflammable or explosive gas, chiefly methane, sometimes, as in case of leakage of natural gas, accompanied by ethane. When mixed in certain proportions with air the mixture is explosive. (See Methane.)

Fire damp.—The term "fire damp" in these regulations is used in the sense employed by miners as synonymous with "gas," and may or may not be in such proportions with air as to be explosive when ignited.

Methane.—"Methane" is a hydrocarbon gas (CH_4) frequently encountered in coal mines; it is inflammable and when it is diffused through air in proportions of 5.5 to 14.5 per cent, the mixture in the presence of a flame or hot spark will explode.

Ethane.—Ethane is a hydrocarbon gas (C_2H_6) found with other lighter hydrocarbon gases in natural gas in conjunction with methane.

Permissible.—The term "permissible" as applied in these regulations in connection with explosives, safety lamps, electric machinery, rescue apparatus, and other devices shall mean materials, apparatus, and devices officially listed by the Bureau of Mines under a schedule of tests and approved as having met its requirements for the respective specified uses.

Potential and voltage.—These shall be taken as synonymous terms to mean electrical pressure as determined by a voltmeter.

POWERS AND DUTIES OF MINING SUPERVISOR, DISTRICT MINING SUPERVISOR, AND DEPUTY MINING SUPERVISOR.

It shall be the duty of the mining supervisor, district mining supervisor, and deputy mining supervisor:

Inspection and supervision by supervisor.

SEC. 1. To visit from time to time leased lands where coal-mining operations are being conducted, and to inspect and supervise such operations and plants connected therewith in order to prevent injury to life, wastage of coal, damage to or from oil and gas wells passing through the coal beds, and damage to other property and to equipment, and in order to supervise matters pertaining to the welfare of the miners in accordance with the provisions of these regulations.

Reports of inspections to the Secretary of Interior.

SEC. 2. To make reports to the Secretary of the Interior as to the condition of the leased property and the manner in which the operations are being conducted and his orders are being complied with, and to submit information and recommendations from time to time for safeguarding and protecting the property of the lessor and securing compliance with the provisions of the lease and these regulations.

Ascertain amount of damages for coal wasted.

SEC. 3. To ascertain and report the nature and amount of damages, if any, to the leased premises or to adjacent property belonging to the Government, to report the amount and value of any coal avoidably lost or wasted, and to make recommendations on the action to be taken to the Secretary of the Interior.

Issuance of orders not in conflict with regulations or State laws.

SEC. 4. The mining supervisor, the district mining supervisor, and the deputy mining supervisor may issue such orders and notices in writing as may be appropriate to secure compliance with these regulations, and may order the discontinuance or modification of any operation or method that is causing or likely to cause any endangerment of life or property or is in violation of the provisions of the lease or regulations: *Provided*, That such orders are not in conflict with the laws of the State in which the leased land is situated: *And further provided*, That in cases where immediate danger to life or property is not involved the order and notices of a deputy or district mining supervisor are subject to review, pending which, if an appeal is made within 10 days by the lessee, execution is stayed, unless it be stated in the order that danger of loss of life or loss of the mine is involved, the deputy or district supervisors' orders are subject to review by the mining supervisor, and his in turn on further appeal are subject to final review by the Secretary of the Interior.

Appeal may be taken from supervisors' orders to Secretary of Interior.

Prescribe or approve methods or protection from oil and gas wells.

SEC. 5. To prescribe or approve the methods of protection from oil and gas wells through the coal measures and mines both with respect to prevention of leakage of oil or gas endangering the lives of employees, and also to prescribe or approve methods of obtaining the ultimate extraction, so far as possible, of coal in the vicinity of oil or gas wells.

Conditions for abandonment of mined or of unmined portions of a mine.

SEC. 6. To specify in writing under what conditions a mine, or panel, or other section of a mine from which the coal has not been extracted may be abandoned by the lessee, and how the section of a mine so abandoned should be sealed off or otherwise separated from the other parts of the mine.

DUTIES OF LESSEE.

Lessee shall observe orders of supervisors in accordance with regulations and terms of lease and not in conflict with State laws.

SEC. 7. The lessee shall observe and carry out the terms of the act of February 25, 1920, and of his lease and the orders and written notices of the mining supervisor, district mining supervisor, and deputy mining supervisor, which are in accordance with the regulations and terms of the lease and which are not in conflict with the laws of the State in which the leased land is situated: *Provided,* That when the order and notice does not require immediate action for the protection of life or property, an appeal may be taken successively from the order of the deputy mining supervisor to the district mining supervisor, to the mining supervisor, and to the Secretary of the Interior for final decision as provided in section 4 of these regulations.

Appeal from decision of supervisors to Secretary of Interior.

Extension of survey and maps each six months.

SEC. 8. Accurate surveys shall be made at least every six months, and the mine-office maps of each coal bed shall be extended to show the amount of advancement of all the mine workings and all other changes of a permanent character that have taken place during the six months preceding the survey.

Worked-out areas to be shown on map.

SEC. 9. (a) There shall be shown on the map of the respective coal bed, in addition to the information specified in the lease, the location of all pillars or parts of pillars extracted and the territory abandoned in which the pillars have not been completely recovered.

Surface buildings and bore holes to be shown on map.

(b) There shall be shown in outline on the surface map the location of all structures or buildings and the location at the surface of each prospect bore hole appropriately numbered, and legends on the map or margin thereof shall show the elevation of the surface at that point, the elevation and thickness of each coal bed penetrated, the elevation of the bottom of the hole, and any other important information concerning same, including the angle and direction of drilling where not vertical.

Blue prints of map to show stoppings, dams, ventilation, etc.

(c) The lessee shall show on the blue print or reproduction furnished annually to the representatives of the lessor, the position of all fire walls, dams, main pumps, fire pipe lines, permanent ventilating stoppings, doors,

overcasts, undercasts, and regulators; the direction of the ventilating current in the various parts of the mine at the time of making surveys for the extensions of the mine map; and fire areas, known bodies of standing water either in or above the workings of the mine, areas containing inflammable gas, and areas that have squeezed.

Profiles of steep-dipping beds shall be made.

(d) Where the coal bed or beds dip steeper than 45°, profiles or vertical cross sections parallel with the approximate average direction of the dip and not more than 1,000 feet apart shall be made on the same scale as the mine maps, with appropriately marked reference points.

Vertical view of workings in bed dipping over 45°.

(e) Where the average dip of a coal bed being worked is more than 45°, a vertical view shall be prepared on the same scale as the general mine map, which will represent the mine workings in that bed on a vertical plane parallel with the average strike of the bed or beds, and which will have appropriately marked reference points thereon.

(f) Blue prints or reproductions in duplicate of the profiles and vertical views called for in the preceding subsections shall be submitted annually on request of the mining supervisor.

Preliminary plans of mining to be submitted in advance of operations on a commercial scale.

SEC. 10. After necessary prospecting has been done on any lease and before permanent operating shafts, slopes, drifts, or tunnels have been made, the lessee shall prepare a preliminary plan together with vertical sections to indicate so far as known the positions, dip, and thickness of each coal bed as indicated by prospect openings and drill holes, and also the character, position, and dip of overlying strata, on a scale of not more than 200 feet to the inch, and show in outline the principal prospect and proposed entries, airways, shafts, and structures, including fan or fans, with an outline plan and description of the proposed method of underground development and ventilation, which plan and description shall be submitted to the district mining supervisor; and the lessee shall develop and mine the coal in the leased land in accordance with the plans submitted, in so far as natural conditions will permit. If conditions are encountered which require radical changes, modified plans will immediately be submitted, accompanied by an explanation to the district mining supervisor.

Development of mine to be in accordance with preliminary plan.

Second exit to surface to be provided where more than 10 men employed on a shift.

SEC. 11. In every separate mine in which more than 10 men are employed underground on any shift, the lessee shall provide in addition to the main shaft, slope, or drift, an escape way or second means of egress to the surface, which in case of drift, slope, or tunnel exits shall be separated at the surface from the first exit by not less than 50 feet of rock or coal in place; and if either or both exits are by vertical shaft or by inclined shaft, the exits shall be not less than 200 feet apart. An escape way or outlet through an adjoining mine which has adequate facilities for escape will be regarded as a satisfactory

Outlet through adjoining mine.

compliance with this requirement if at all times available and kept in proper condition for use. If such adjoining mine shall be abandoned at any time or shall cease to operate indefinitely, the lessee hereunder shall be solely responsible for the cost and expense of maintaining such outlet, and if such outlet shall be abandoned or permitted to become unsafe for use, not more than 10 men shall be employed underground in the mine on any one shift until a second exit or escape way is obtained and made safe for use: *Provided*, That where men have been entombed by an accident, this regulation will be suspended, for the purpose of carrying on rescue work.

Hoists and stairways and ladders required for egress in shafts in which more than 10 men are employed.

SEC. 12. In any shaft mine in which more than 10 men are employed underground on any shift, unless there is means of escape by drift, tunnel, or slope, one shaft must be equipped with hoist and cage suitable for hoisting or lowering men as specified in sections 21 to 25. The second shaft serving as an escape shaft may be provided with a substantial stairway with handrails, the flights not over 45° pitch with suitable landings at each turn.

Hoists required at both shafts when over 300 feet deep and more than 100 men are employed underground.

SEC. 13. In a mine in which more than 100 men are employed underground on any shift, if the escape shaft is more than 300 feet in depth vertically, it shall be provided with an adequate hoist and cage and a signaling system for hoisting men, and a qualified and experienced hoist man shall be available, on appropriate signal from underground of fire, explosion, inundation, or other emergency, to proceed to the hoist and act as hoist man. The hoisting equipment and cages in each of the two shafts—main shaft and escape shaft—shall have sufficient capacity independently of one another to hoist out of the mine all persons on any shift in 30 minutes, with due regard to safety in emergency hoisting.

Emergency ladderway in shafts over 300 feet deep.

SEC. 14. In shaft mines over 300 feet in depth in which over 100 men are employed underground on any shift either in the main or escape shaft, there shall be an emergency ladderway with landings every 20 feet vertically apart and not exceeding 80° pitch. A stairway as described in Sec. 12 may be substituted for the ladderway.

Passageway around shafts.

SEC. 15. At each landing of a shaft there shall be made and kept free of obstruction a passageway at least 6 feet high and 4 feet wide that will enable persons to pass from one side to the other side of the shaft without passing through any compartment of the shaft: *Provided*, A compartment of a shaft may be used for a passageway if same is not used for hoisting, when properly floored and roofed over by bulkhead sufficiently strong to protect men passing underneath from heavy falling bodies.

Support of roof and sides of traveling roads.

SEC. 16. The roof and sides of every traveling road and working place shall be made secure by timbering or adequate lining and arching, and a person shall not, unless appointed for the purpose of exploring or repairing,

travel on or work in any traveling road or working place which is not secure.

No building of inflammable material to be constructed within 75 feet of any mine.

SEC. 17. The lessee shall not construct or maintain on the surface any structure of inflammable material within 75 feet of any opening; nor permit an inflammable structure to be connected to any of the noninflammable buildings that are within this distance except as follows:

Exceptions.

(a) An open timber framework or head frame of timber may be constructed over a shaft, slope, drift, or tunnel. The posts and rafters of any such structure may be of wood if the covering or lining is made of noninflammable material, but under no circumstances shall wood flooring be used, except in tipple and trestle structures.

(b) Inflammable material shall not be stored or placed within 75 feet of any mine opening, except while sending down into or removing such material from the mine, and except for a day's supply of oil for lubricating machinery in the respective structures.

Minimum thickness of pillar between intake and return airways.

SEC. 18. (a) The lessee shall separate intake and return airways and any adjacent parallel entries where the coal bed is more than 5 feet in thickness by not less than 50 feet of coal in place. Where the coal bed is less than 5 feet in thickness the pillar between the main intake and return airways shall be not less than 30 feet in thickness except that when the coal is less than 2 feet in thickness the pillar may be reduced to 20 feet, provided the roof and floor are strong and resistant to weathering.

Distance between crosscuts or breakthroughs.

(b) The distance apart of crosscuts or break-throughs between parallel entries or rooms shall be in accordance with the regulations of the State in which the leased land is situated, but the distance shall not be more than 100 feet, except in entries or tunnels where special arrangements are made to carry an adequate ventilating current to the face of each entry or tunnel, the adequacy of such provision to be approved by the district or mining supervisor. In no case shall rooms be turned ahead of the last crosscut nearest the face, nor shall branch entries or tunnels be started ahead of the last crosscut, except when approved by the district or mining supervisor for driving for a connection to obtain a circuit of air or a second means of egress.

Pillar between entry and parallel room not less than 50 feet in thickness.

(c) The pillar between any entry and a parallel room or panel working shall be not less than 50 feet in thickness, and as much more as may be required in the judgment of the mining supervisor.

Room neck minimum width and length.

(d) Room necks shall not be wider than 9 feet for a distance not less than 18 feet in length, unless the lessee is given permission in writing by the mining supervisor to make the room necks wider and shorter than above specified.

Coal in chain pillars and room stumps.

(e) The coal in chain pillars and room stumps and panel boundary pillars provided under sections b, c, and d shall be left standing until in the proper course of

mining operations the time shall arrive for their removal, following or during the extraction of the room pillars in the adjacent workings: *Provided*, That where the advancing long-wall method is used all coal may be excavated, in which case pack walls of appropriate thickness shall be built and the space between the intake and return airways shall be tightly packed with rock or sand.

Main entries and airways over 4,000 feet from shaft.

SEC. 19. When any portion of the coal on the lease requires for its extraction main levels or entryways for ventilation and escapeways more than 4,000 feet in length beyond the nearest air shaft or place of egress, in which area may be comprised the workings in one or more separate coal beds of the same mine, and in which area more than 100 men are employed on any shift, the entries and airways extending to such section or area shall be not less than four in number:

Additional passageways.

Provided, That where only two levels or entries are driven prior to entering such section or area, entry pillars shall be left of sufficient width to permit the driving of the necessary additional passageways to the area. Separated pairs of parallel entries entering the area in question and properly maintained will fulfill the foregoing respective requirements: *And further provided*, That if the advancing long-wall method is used to extract the coal, pillars will not be required, but the number of levels or entryways specified shall be made and maintained in good order through the areas excavated by the long-wall method: *And further provided*, That if coal on leased land is to be mined from a mine already existing either on the public domain or private ownership, and if, in the opinion of the mining supervisor, there are adequate ventilation passageways and escapeways, the foregoing requirements may be waived with the approval of the Secretary of the Interior.

Hoisting equipment; standard character.

SEC. 20. (a) All hoisting equipment used in shafts and slopes shall be of ample capacity, and the design of a commercially recognized safe standard character, and in accordance with the respective State requirements.

Drum flanges.

(b) The drums or cable reels of hoists shall be provided with flanges which will extend at least 2 inches radially beyond the last layer of rope when the rope is coiled on the drum or reel.

Hoist brakes.

(c) All hoists shall be equipped with brakes sufficient to stop and to hold the fully loaded unbalanced cage or skip at any point in the shaft or slope, and said hoist shall have sufficient power to hoist a loaded unbalanced cage or skip.

Electric hoist, automatic stopping.

(d) All electric hoists shall be equipped with protective devices which will immediately bring the hoist to rest upon failure of power and will permit the lowering of the cage by brakes after it has been brought to rest through the failure of power.

Hoistway clearance.

(e) In shafts and slopes where men are hoisted or lowered, there shall be at least 20 feet of hoistway clearance above the landings at which men enter or leave the cages or cars; and at mines in which over 200 men are employed underground on any shift there shall also be overwinding and overspeeding devices connected with the hoist, or equivalent devices approved by the mining supervisor shall be installed and maintained to prevent the cage from being overwound or from falling if overwound, and from overspeeding considering the character of the hoisting equipment and depth of hoisting.

Overwinding and overspeeding devices or detaching hooks.

SEC. 21. (a) Cages when used for hoisting men shall have bonnets extending over the space on which the men stand, shall have steel or sheet-iron or wire-mesh sides extending not less than 5 feet above the floor of the cage or of each deck of a multiple-deck cage, and when hoisting or lowering men shall have gates or doors at least 5 feet high, closing the entrances to the cage on each deck when used for men. Each deck of each cage used for hoisting men shall have overhead bars, and be arranged so that every man on the cage may have an easy and secure handhold.

Bonnets, gates, and handholds on cages for hoisting men.

Safety catches on cages.

(b) Cages, when hoisting or lowering men, shall be provided with safety catches, capable of bringing to a stop the fully loaded cage within a distance of 10 feet in any part of the shaft or headframe in case the rope or rope connection should break.

Self-dumping cages, nonoverturning, in shaft.

(c) Self-dumping cages used for hoisting men shall be so designed that the platform can not overturn in the shaft.

Landing gates.

SEC. 22. For vertical or inclined shafts, automatic closing covers, or gates 5 feet high, shall be used at the top landing and hinged or sliding gates at least 5 feet high shall be required and kept closed at the ground landing and underground landings when men are not entering or leaving the cages and coal or material is not being taken on or off the cages: *Provided*, That at the main bottom landing or levels from which coal is caged the gates may be raised or swung out of the way during a period of continuous hoisting and caging cars when an attendant is constantly at hand.

Cage rests or chairs.

SEC. 23. Cage rests or chairs shall be used at all shaft landings that are regularly used in hoisting or lowering men unless their omission be authorized in writing by the mining supervisor.

Protecting shaft openings, slopes, and sumps.

All vertical or inclined shaft openings shall be securely fenced and the gates thereof shall be so constructed or placed that loose coal, rock, or débris will not roll or fall through them into the shaft. The track at the ground landing shall have a derail device that shall always be kept open except when a car is being taken from or being placed on the cage at said landings. Where a shaft not used for hoisting men or a slope or a sump extends below

the floor of a mine passage or excavation, it shall be adequately fenced or otherwise guarded.

Shaft sinking, safety hooks, and crossheads.

SEC. 24. Shaft-sinking buckets shall be provided with self-locking safety hooks and, when the shaft is over 100 feet in depth, with crossheads and guides. The mouth of the shaft shall be covered, when dumping rock or loading or unloading material, by safety doors or the equivalent of a safe design and construction.

Lights at top and underground landings.

SEC. 25. When any men are employed in the mine or required to enter or depart from the mine between sunset and sunrise, there shall be maintained at the top landing of the hoist, shaft, or shafts, sufficient light or lights to enable a person to see the landings and there shall be a light at each underground landing used for caging men on each side of and within 10 feet of the shaft or slope at such time as men are employed in the mine. Each such landing shall be painted and maintained white, or whitewashed at frequent intervals.

SEC. 26. All flywheels, gears, belts, and all exposed moving parts that are liable to cause injury, or dangerous parts of machinery used in and about a mine shall be

Guards to machinery, stairs, and platforms.

appropriately guarded to prevent injuries to attendants or other persons. Stairs, platforms, and dangerous walks in or about the mine or stripping operation shall be provided with rails, fences, and gates.

SEC. 27. (a) Any rope or cable used for hoisting or lowering men shall be of metal hoisting cable of recognized standard character and when newly installed in

Safety factor of hoisting ropes.

the shaft or slope shall have a safety factor of not less than 6, which shall be calculated by dividing the breaking strength of the rope, as rated by the manufacturer, or in accordance with tests on a sample by the United States Bureau of Standards, by the sum of the maximum load to be hoisted plus the total weight of the rope when extended to the bottom of the hoistway; or, if the hoistway is inclined, the calculated component of the weights parallel with the incline.

(b) No rope or cable shall be used for hoisting and lowering men when the wear has reduced the safety factor to below 4.5, as determined by tests of the piece

When to discard hoisting rope.

showing maximum wear, when on inspection it is found that the number of broken wires exceeds six in any single pitch length or lay of the rope, when the wires on the crown of the strands are worn down to less than 65 per cent of their original diameter, or when inspection indicates a dangerous amount of corrosion or distortion: *Provided, however,* That when such broken wires are reduced by wear more than 30 per cent in cross section, the number of breaks in any lay of the rope shall not exceed three. All hoisting ropes and rope connections shall be inspected once in every 24 hours by some competent person designated for the purpose by the lessee.

Inspection of hoisting ropes.

If upon inspection a hoisting rope or cable is considered unsafe, or if it shall be found to be below the requirements

set forth in this section, it shall be put out of use for such purpose forthwith.

(c) Cages, skips, or cars used in hoisting or lowering men shall be connected to the hoisting rope or ring by standard babbitted or zinc-filled sockets, or by clamps, and the ropes shall be resocketed or reclamped at intervals not

Attachments of hoisting rope to cage.

exceeding four months, and at least four feet of the rope shall be cut off from the end to be socketed or clamped, and clamping shall be so done that at least 80 per cent of the breaking strength of the rope shall be attained.

(d) Hoisting rope shall be firmly clamped to the drum

Fastening of hoisting ropes to drum or reel.

or reel, and at least two turns of the rope shall remain on the drum or reel when the cage or skip attached to the rope rests at the bottom of the shaft.

(e) Every hoisting rope shall be treated with oil or

Dressing of hoisting ropes.

with some suitable rope-lubricating compound at least twice every month. Such compound shall be chemically neutral and shall be of such consistency as to penetrate the strand and not merely cover the surface of the rope.

(f) The lessee shall keep a record in a book in the

Records kept of hoisting ropes.

office of the mine of every hoisting rope used for hoisting or lowering men, noting the length and cross-sectional dimensions of the rope, the breaking load of the rope, the name and address of the maker, the date of purchase, the date when put in use, the designation of the shaft and compartment in which the rope is used, the dates of resocketing, reclamping, and shortening, the length of rope cut off at each such operation, the dates of reversing ends, the date when discarded, and the reason for discarding.

28. (a) Duly authorized and competent representatives

Examinations of hoisting and mechanical equipment.

of the lessee shall make daily a general examination of all hoisting equipment and mechanical apparatus for the hoisting or transportation of men in and about the mine, including skips, cages, guides, ropes, sheaves, hoists, motors, engines, and boilers; and once each week a more detailed examination shall be given and a memorandum of the condition of the above shall be entered in a record book kept in the mine office. Thorough internal examination of boilers shall be made at least semiannually.

Boiler inspection.

(b) If an inspection discloses a defective condition or

Defect in apparatus remedied before further use.

arrangement of any apparatus, appliance, or device which endangers the safety of employees or other persons, that defective condition or arrangement must be remedied before further use endangers life.

SEC. 29. Where men enter shaft mines by cage or skip,

Raising and lowering cage or skip prior to lowering men.

the cage or skip shall be lowered to the bottom of the shaft and raised to the surface just prior to the beginning of a shift and before the men are permitted to be lowered.

SEC. 30. At the top of, and at each landing of a hoisting

Code of signals in hoisting.

shaft or slope and in the hoisting-engine house, there shall be kept posted in a manner easily read a code of signals

for use in directing the operation of the cages. Said code shall be in accordance with the codes required by the State mining laws of the State in which the mine is situated, and if not otherwise specified the following code of signals shall be used: (a) When the engine is at rest, one signal, hoist; (b) when the engine is in motion, one signal, stop; (c) when the engine is at rest, three signals, men ready to get on the cage to ascend; when this is followed by return signal from the engineer, the men get on the cage, and then the proper signal to hoist or to lower shall be given. Additional signals to suit the local conditions may be added by the lessee.

Two methods of signaling required.

SEC. 31. There shall be at least two effective methods of signaling between the engine room and each of the shaft or slope landings, one of which methods, in each case, shall be a telephone or speaking tube. The signals shall be so arranged that the cager or person in charge of each landing can signal direct to the hoistman and the hoistman can also signal direct to each of the landings. Calling or rapping on metal shall not be accepted as a proper method of signaling.

Telephones from surface to and into mines.

SEC. 32. The lessee shall provide and maintain, in each mine where more than 100 men are employed underground on any shift, a telephone system between the hoisting-engine room, the ground landing of the shaft or slope, the principal mine exit of drift mines, the fan building when same is located 1,000 feet or more from the power house or main exit of the mine, and such other points on the surface as may be advisable for safety of the employees. The telephone system shall also extend into the mine and telephones be placed on each shaft or slope landing in use and at the inside siding of each of the main haulage roads. The underground telephones shall be so placed that no 20 men shall be more than 1,000 feet from the nearest telephone station. Telephones shall also be placed in each refuge and first-aid chamber.

The telephones inside of the mine shall be of standard underground type, inclosed in tight metal boxes. The telephone wires shall be carefully installed and be placed along the side of the entry opposite the power lines.

Ventilating fan to be provided where more than 10 men are employed.

SEC. 33. (a) In any mine in which more than 10 men are employed on any shift the lessee shall provide on the surface a fan or other mechanical means for circulating within the mine such amount of ventilating current as may be required by the law of the State in which the mine is located, or such additional amounts as are specified in these regulations; such fan or other mechanical means and the connection between same and the point of the entrance of the air current into the mine shall be made of noncombustible material; and the lessee shall not set the fan or equivalent in line with the axis of any mine opening, but shall place same at a distance of not less than 25 feet from the projection of the nearest side of such opening, and

shall provide explosion relief doors of the full area of the air shaft or airway in direct line with any and all such mine openings in order to protect said fan or other mechanical means of air circulation in case of a mine explosion. Such fan or equivalent must be so arranged that the ventilating current can be reversed quickly.

Fan not to be placed in direct line with any mine entrance.

(b) The main fan or fans used to ventilate a gaseous mine, when electrically driven, shall also be provided with an auxiliary steam or internal-combustion engine, or hydraulic power with suitable belt or driving connection which can be quickly connected and operated should the electric power fail.

Temporary fan may be installed.

(c) That during such time as the mine is being opened up and less than 100 men are employed underground on any shift, and with the written approval of the authorized representatives of the lessor, a fan of sufficient capacity may be set up temporarily while the permanent fan is being erected.

Use of fan at adjoining mine permitted under certain conditions.

(d) A mine in leased land may be ventilated by means of a fan of a mine not on the leased land when less than 25 feet from any projection of the nearest side of the mine opening; no part of the fan or of the housing is to be in line with said opening: *Provided*, The fan had been installed prior to the date of the lease and the fan and setting conform, in all other respects, to the foregoing requirements: *And further provided*, The intake air on entering the mine on leased land does not contain at any time more than one-fourth of 1 per cent of methane, as determined by samples gathered by the lessor's representatives and analyses made by the United States Bureau of Mines: *And further provided*, The airway connections to the mine in leased land are protected by rock-dust barriers or equivalents in accordance with specifications given in publications of the United States Bureau of Mines.

Auxiliary or booster fans in nongaseous mines.

SEC. 34. Electrically driven auxiliary or "booster" fans may be used in nongaseous mines when there is no exposed inflammable material within 10 feet of the fan and motor.

Auxiliary or booster fans in gaseous mines.

SEC. 35. An electrically driven auxiliary fan may only be used in a gaseous mine when located on the intaking air current and when there is no exposed inflammable material within 10 feet of the fan and motor, the motor and switch being explosion proof and of a kind approved by the United States Bureau of Mines: *And further provided*, That there shall always be an experienced gas inspector or fire boss in attendance in the immediate district at all times while the fan is running, who shall make hourly inspections to determine if methane in dangerous quantities as defined in section 38b is passing the fan, and if the fan is oiled and running properly. Auxiliary or booster fans may be used either in a gaseous or nongaseous mine when driven by compressed-air engines or equivalent which can not ignite gas.

Recirculation of air by booster fans.

SEC. 36. An auxiliary fan within a mine shall not be considered adequate if the air currents are caused to recirculate by such fans to an amount exceeding 10 per cent of the volume circulated by the fan.

Minimum quantity of ventilating current per man.

SEC. 37. The lessee shall provide a ventilating current of not less than 100 cubic feet of air per minute for each person employed underground on any one shift and 500 cubic feet for each mule or horse; or such larger amounts as may be required by the regulations of the State in which the lease is located; said ventilating current to be measured in each of its various splits at the last entry, crosscut, or break-through nearest the face, for the

Not more than 75 men on any one split of air current.

number of men served by that split of air, and not more than 75 men shall be employed on any one split of air current, unless the mining supervisor gives written permission temporarily to employ a larger number.

Quality of mine air as determined by analysis.

SEC. 38. (a) A working place, entry, or passageway shall not be deemed normally in a fit condition for men to work or travel in if the air therein, as determined by chemical analysis by the Bureau of Mines of at least four samples in duplicates gathered at intervals of not less than two days apart by the mining supervisor, district mining supervisor, or deputy mining supervisor, each show on a moisture free basis more than 1¼ per cent carbon dioxide or less than 19 per cent oxygen. The lessee upon being notified of such finding shall immediately undertake measures to improve the quality of the air of said working place or entry.

Determination of a gaseous mine or district in same.

(b) For the purposes of these regulations, a mine or portion of a mine shall be deemed gaseous if so defined by the mine inspection department of the respective State in which the lease is located, or if the mining supervisor or district mining supervisor shall, on three occasions, not less than two days apart, determine by tests with approved safety lamp or by chemical analysis the presence in any district of the mine of 2 per cent or more of methane in the atmosphere of the working place or entry, or if the return air of any ventilation split shows by analysis of three samples taken in duplicate at least two days apart that each contains one-half per cent or more of methane, the mine or a district of same shall be deemed gaseous: *And further provided*, That if any similar occurrence of methane takes place in more than one split of ventilating current, the entire mine shall be rated as a gaseous mine.

After 6 months second series of tests may be made to determine gaseous condition.

(c) If in a mine, or district of same, determined as above to be gaseous, the mine examiners find no fire damp for a period of six months following first determination, the mining supervisor or the district mining supervisor may, at the written request of the lessee, make a second series of tests identical with those previously specified to determine if the mine or district continues gaseous. A second finding of a gaseous state shall determine the mine to be

Again, by two year periods.

gaseous for a period of at least two years, when a similar series of tests may be made to determine whether the

mine continues gaseous, and similarly, each two years, tests may be made. If after any series of tests above specified, the mining supervisor, from the favorable results of the tests and of the mine examiner's records, considers the mine or district in same can be rated non-gaseous and without greater hazard than presented by nongaseous mines in the region, he may so rate the mine and notify the lessee.

On favorable tests and records may be rated nongaseous.

(d) From the time the mine or district of a mine is first determined to be gaseous until determined by the mining supervisor to be nongaseous for the purpose of these regulations; and unless rated nongaseous by the respective State mine inspection department, the lessee shall permit no open lights to be used in said mine or district, but only locked "permissible" safety lamps, either flame or electric, approved by the United States Bureau of Mines, shall be used.

No open lights permitted in gaseous mine or district, but only "permissible" lights.

Entrance to gaseous mine or district to be guarded.

SEC. 39. When a gaseous district has been established in a mine, or a mine has been determined to be gaseous under the foregoing regulations, the lessee shall cause to be stationed in each entrance to the mine or gaseous district of the mine where men enter, fire bosses or examiners, who shall examine the lamps of all men entering such district or mine to determine if they are permissible flame or electric safety lamps and are in a safe condition. The lessee shall not permit men who carry open lamps, open lights, matches, smoking tobacco, cigarettes, or cigars to work or enter gaseous districts or gaseous mines. When a gaseous district has been established within a mine, a fire boss or examiner shall remain stationed at each entrance so long as there is a shift at work in that vicinity, to prevent the entering of men with open lamps, open lights, matches, smoking tobacco, cigarettes, cigars, or means of causing ignition of gas other than explosives, which shall be handled and used as hereinafter specified.

Lessee shall appoint superintendent.

SEC. 40. (a) The lessee shall appoint a mine superintendent who shall have at least five years' experience in and around coal mines, who has a practical knowledge of mine gases, timbering and mining machinery, and whose qualifications are at least equivalent or superior to those required for underground foremen in gaseous mines as specified by the respective State laws, or if not specified, the qualifications shall be in accordance with the best requirements of the mining region for similar positions. The mine superintendent may have jurisdiction over one or more mines on the lease.

Lessee may serve as superintendent if qualified.

(b) A lessee duly qualified in accordance with the foregoing may serve as superintendent.

Lessee shall appoint a qualified mine foreman.

SEC. 41. (a) The lessee shall appoint for every mine employing more than 25 men underground on any one shift in each separate mine on the leased land an ex-

perienced mine foreman of qualifications of at least five years' experience in or at coal mines and with a good practical knowledge of mine gases, timbering and mine machinery, and otherwise in accordance with the requirements of the respective State regulations, who shall visit and inspect from time to time all accessible parts of the mine and who shall be in responsible charge of the mine underground.

Superintendent may serve as foreman when less than 25 men underground.

(b) When there are 25 men or less employed underground on any one shift by the lessee, the superintendent may also serve as the mine foreman, provided he is qualified to do so by the respective State regulations.

Appointment of assistant foremen.

SEC. 42. (a) In any mine in which more than 100 men are employed underground on a shift, the lessee shall appoint at least one experienced assistant mine foreman, with qualifications and duties similar to those of foreman, and an additional assistant mine foreman for every additional 100 men employed underground in that mine.

Mine foreman may serve as fire boss.

(b) The foreman or an assistant foreman, if duly qualified in accordance with the respective State regulations and his other duties permit, may also serve as fire boss or mine examiner.

Appointment of fire bosses or mine examiners.

SEC. 43. (a) The lessee shall appoint a sufficient number of fire bosses or mine examiners to examine every working place and accessible part of the mine within three hours prior to the entrance of a shift of miners, when shifts in the same district of the mine do not immediately succeed one another, to determine if every place is free from a dangerous quantity of fire damp or noxious gas, and if the roof and other conditions are safe for the workmen. Any place that has been undercut by a machine, or in which the coal or roof has been blasted within less than three hours prior to the time of entrance of a shift, shall be examined by the fire boss or mine examiner before the workmen are permitted to enter.

One fire boss for every 75 men employed in gaseous mines.

(b) In any gaseous mine there shall be at least one experienced fire boss or mine examiner for every group of 75 men or fraction thereof employed underground.

Fencing and marking off of dangerous places.

SEC. 44. The fire bosses or examiners shall fence off and mark all dangerous places to prevent the entrance of men into such places, shall record in chalk on a blackboard or equivalent means, at the entrance of each district, the places which have been marked off, and shall station themselves at the entrance to such a district at or near the mouth of the mine to warn and stop miners who normally would work in places found dangerous from entering until the dangerous conditions have been remedied under their supervision or that of a duly accredited mine official.

Withdrawal of workmen for dangerous conditions of gas or roof.

SEC. 45. If at any time it is found by the person for the time being in charge of the mine, or any part thereof, that, by reason of the prevalence of inflammable or

noxious gases, or of any cause whatever, the mine or any place in the mine is dangerous, every workman shall be withdrawn from the mine or place found dangerous. For the purpose of this section, a place shall be deemed dangerous if the percentage of inflammable gas in the general body of the air is found to be as much as 2 per cent, or as much as 3 per cent of carbon dioxide, or if there are indications of an extensive fall of roof or of a serious "squeeze" over any section where men are working.

No men to enter mine following interruption of ventilation until authorized.

SEC. 46. In a gaseous mine, when the fan or fans have accidentally stopped or have been shut down for repairs, or the ventilation is otherwise interrupted for a period of more than 15 minutes; or in a so-called nongaseous mine, when the fan has been shut down for more than four hours, no men shall be permitted to enter the mine until the fan has been in operation for two hours and the fire bosses or mine examiners have returned to the surface and reported to the mine foreman that they have examined all the places and it is safe for any or all of the men to enter.

Removal of bodies of gas.

SEC. 47. When any body of methane or fire damp of an amount that would be a menace to the men in the mine or in a district of the mine has been found in any working or workings, no men other than the repair men accompanied by the mine foreman or fire boss or bosses, shall be permitted to enter the mine until the body of the gas has been removed by means of the air current, through the erection of brattices or changes in the ventilating currents, and no open lights shall be permitted in the mine while this is in progress.

Keeping records of air measurements.

SEC. 48. The quantity of air in the main current and in every split shall be measured with an anemometer or approved equivalent at least once every week by the mine foreman or fire bosses and entered in a book kept in the mine office, with a record of the findings of dangerous gas.

Ventilating recording instruments.

SEC. 49. The fan at mines in which 25 or more men are employed underground on any one shift shall be equipped with a recording instrument by which the ventilation pressure shall be continuously registered. The registration chart for each day with the date thereof shall be kept in the office of the mine for at least one year.

Fan shall not be stopped or reversed unless authorized by official in charge.

SEC. 50. The fan shall not be stopped, reversed, or changed in speed except by orders of the official then in charge of the underground workings. In case of explosion or fire, if the underground official in charge can not be reached, the superintendent of the mine, or in his absence, the official in charge of the surface, if thoroughly conversant with underground conditions, may take the responsibility of stopping, reversing, or changing the speed of the fan, provided this procedure is in accordance with the respective State regulations. It should be fully understood, and a notice posted in a

suitable place in the office of the mine and in the fan house to the effect that the fan should not be stopped, reversed, or changed in speed under any condition except by direct orders as above.

Reporting of dangerous conditions by fire boss or examiner.

SEC. 51. (a) The fire boss or examiner shall record the findings of dangerous or gaseous conditions in accordance with the respective State regulations, and in addition each fire boss or examiner shall have a book in which these findings are recorded, and on returning to the surface shall place same in the official office of the mine, or if this office is more than half a mile distant from the exit, shall temporarily place it in a suitable and secure place adjacent to the exit, should his duties require re-entering the mine.

Fire-boss report, records copied and signed.

(b) The reports of the fire bosses or mine examiners shall be assembled and copied once a day in a record book kept in the office of the mine and signed each day by the fire bosses or examiners.

The foregoing provision shall not be construed as preventing the following out of any State regulations, but shall be considered as supplementary.

Sealing off abandoned areas by fireproof stoppings.

SEC. 52. (a) All worked-out areas, or areas abandoned permanently or temporarily, that can not be so ventilated as to prevent the accumulation of explosive and noxious gases, or by reason of the conditions can not be daily inspected by duly authorized mine officials, shall be sealed off by fireproof stoppings constructed of strong concrete or masonry of solid substantial character not less than 30 inches thick and keyed or recessed into the side walls; and a pipe with locked valve shall extend through the stopping for the purpose of testing by the foremen or mine examiners the gases behind the stopping.

Bore holes to be drilled from surface to drain gas accumulations.

(b) When inflammable gas is liberated in sealed areas in such quantities and under such pressure that it leaks through the stopping or surrounding pillar, and enters the air current which ventilates active working places, a bore hole shall be drilled from the surface, unless of an unreasonable depth. All the drill holes for drawing off the gas shall have casings not less than 3 inches in diameter. The holes shall be located to enter the highest parts of the sealed area. The casings shall extend at least 10 feet above the surface and to guard against propagation of an ignition of gas at the top of the casing from extending down the bore hole there shall be a triple safety-lamp gauze placed in or over the casing, and there shall be a balanced check valve in the casing to prevent entrance of air when pressure within the sealed area is below atmospheric pressure. In the event that said bore hole is not feasible, or if drilled does not relieve the gas pressure behind the stopping, a pipe line not less than 3 inches in diameter shall be put through the stopping, and to discharge the gas shall extend into a return airway that does not ventilate any live working or haulage or traveling way. The end of the pipe shall be protected by

Gas drain pipe through stopping.

gauze and a check valve and that portion of the mine shall be deemed gaseous.

Ventilation stoppings and repairs.

SEC. 53. When crosscuts or break-throughs are no longer used for the passage of ventilation they shall be closed on main haulage entries with stoppings made of incombustible material and sealed as air-tight as possible; stoppings in the crosscuts between main entries shall be constructed of concrete, brick, or rock masonry or other noncombustible material made as air-tight as possible. The stoppings in crosscuts or break-throughs of rooms and panels or temporary entries may be constructed of wood or of rock and dirt, but wherever important for the circulation of air to the face they should be coated with plaster.

Drilling holes in advance when approaching abandoned workings.

SEC. 54. When any working has approached within 100 feet of any portion of a mine not known to be free from gas or dangerous accumulation of water, the advance workings or headings shall not exceed 9 feet in width and there shall be constantly at least one bore hole, 18 feet in advance, drilled centrally in the face of each heading; and when within 50 feet of conjectured workings, in addition to the center hole, there shall also be drilled in advance at least two holes for each 9 feet advance of the face, one on each side of the heading at an angle of 30° with the axis of the entry or workings, which holes shall be drilled at least 18 feet deep.

Electrical regulations.

SEC. 55. (a) The following regulations govern the installation and maintenance of electrical equipment in and about mines on the leased land.

(b) Where the difference of potential between any two points of the circuit does not exceed 300 volts, the supply shall be deemed low voltage.

(c) Where it exceeds the foregoing voltage and does not exceed 650 volts, the supply shall be deemed medium voltage.

(d) Where it exceeds the latter voltage, the supply shall be deemed high voltage.

Limitation of voltage for underground usage.

SEC. 56. No voltage higher than medium shall be used underground, except that high voltage may be used for transmission or for application to transformers, motors, or other apparatus in which the whole of the high voltage winding is stationary.

High voltage installation requirements.

SEC. 57. All high-voltage power lines installed underground shall be in the form of insulated, lead-covered cables, which shall be armored or otherwise effectively protected against abrasion and the armor shall be electrically continuous throughout and be effectively grounded. Such armored cable may be placed in conduit underground or supported along the ribs or on props.

Voltage of trolley lines, undercutting machinery, and pumps limited to low voltage.

SEC. 58. Locomotives, portable pumps, coal cutting machinery, and other portable electrical machinery used in or about working places that are near the face of the mine, or on roadways traveled by men, shall use only low-voltage current.

Signal wires limited to 30 volts.

SEC. 59. Signal wire circuits shall not use over 30-volt current.

Supports of electric wires and cables.

SEC. 60. (a) All underground electrical power cables and wires unless provided with grounded metallic covering or as specified in section 57 shall be supported by efficient insulators.

Guards for medium voltage where wires are less than 7 feet above floor.

(b) Cables and power wires unprovided with grounded metallic covering or equivalent shall not be fastened to the coal, roof, or timber with uninsulated fastenings. Overhead cables or wires on the traveling side of entries or where men cross under, when less than 6½ feet above the rail, or, if there are no tracks, 7 feet above the floor, shall have troughs or side-board guards, or may be placed in a channel in the roof; the guard where used shall extend 2 inches below the sag between the supports and be so arranged that a man's head or cap will not come in contact with the cable or wire. Power wires along the rib in traveling ways shall be fenced or otherwise protected.

Trolley wire placement.

(c) All trolley wires shall be placed at least 6 inches outside of the rail of the track, and wherever possible on the opposite side of the passageway from that used by men for traveling on foot; and where the trolley wire is less than 6½ feet above the rail and on the same sides of the entries of passageways used for traveling or where men cross under it shall be protected by troughs or side board like those specified in section 60b. Man trips run on motor roads does not construe that the road is a traveling way within the meaning of this section.

Underground electric stations.

SEC. 61. (a) All underground electric stations shall be fireproofed and at all such stations at least one chemical fire extinguisher of a kind approved by the United States Bureau of Mines shall be kept for use in the event of a fire in the electric apparatus.

Electrical installations by safest method.

(b) All electrical installations are to be installed and used so as to insure the greatest safety to workmen.

Warning signs and insulation colors.

(c) Where high voltage is used, fixed warning signs shall be conspicuously posted, and the color of the insulation used on high-voltage wires in electrical stations at transformers and switches shall be different from that used on the medium or low-voltage wires.

Trolley and other electric locomotives in gaseous mine or intake airways only.

SEC. 62. In any mine which is termed gaseous or in which more than one-fourth of 1 per cent of inflammable gas is found in the moving air current, trolley locomotives or storage-battery locomotives that have not been approved by the Bureau of Mines as permissible for use in gaseous mines may be used only in entries or passageways ventilated by intake air; that is to say, air that has not passed through or received the return from rooms, chambers, or abandoned areas; locomotives may be used, however, for hauling coal from the face of the back or parallel entry, provided the haulage is through a crosscut to the intake entry that is located nearer the face than any room or branch entry turned off from, or connected with said back entry in which the air current is returning, and also provided the air current does not contain over one-fourth of 1 per cent of inflammable gas as determined by sampling and analyses.

Lights on locomotives and cars.

SEC. 63. All electric locomotives shall be provided with efficient headlights, and the front end of all trips of cars hauled by other mechanical means shall be provided with a light of an intensity of not less than that used by miners, and on the rear of any trip hauled mechanically or by animals from partings or gathering places there shall be displayed a red light.

Electricity when 2 per cent methane is present to be cut off.

SEC. 64. If at any time in any place in the mine the percentage of inflammable gas in the general body of the air in that place is found to exceed 2 per cent, the electric current shall at once be cut off from all cables and other electrical apparatus in that place, and shall not be switched on again as long as the percentage of inflammable gas exceeds that amount.

Electric mining machines, etc., in gaseous mines.

SEC. 65. (a) Drills and undercutting, shearing, or loading machines, pumps, and other machines, when electrically driven, and uninclosed electric switches shall not be used in gaseous mines or gaseous districts in mines unless the motor and connections and inclosed switches are of a kind approved by the United States Bureau of Mines as explosion-proof.

Tests required in gaseous mines or districts when electric machines are used.

(b) When electric cutting machines and drills are being used in a gaseous mine or district, in addition to frequent tests for gas to be made by the machine runners, the lessee shall be required to have a fire boss or bosses, or examiners make tests for inflammable gas each half hour in each of the places where machines are being used, or are to be used within the half hour.

Records of gas to be kept by examiners.

(c) The examiners shall keep a record of all findings of gas, and if 2 per cent of gas is found in the general body of the air of the working place or in a large pocket, the machine or machines in the vicinity must be stopped and the men withdrawn from that district until the gas has been diluted and carried away by the ventilating current.

Electric lighting circuits on intake only.

SEC. 66. In gaseous mines electric lighting circuits may be used only at the foot of the intake shafts and in the intaking main roads in which the air current contains not more than one-quarter of 1 per cent of inflammable gas as determined by samples gathered from time to time by the district mining supervisor and analyzed by the United States Bureau of Mines.

Cut-out switches near working places.

SEC. 67. (a) In every mine in which electric drills or cutting machines are used, the portable cables shall be connected to the power line by interlocking safety switches accessible to the working place where drills or undercutting machines are used and within 500 feet of the point of each installation of pump or auxiliary fan.

Switches in all circuits at intervals.

(b) Cut-out switches in the trolley lines and lighting circuits shall be placed at the mouth of each branch entry and elsewhere at distances not exceeding 1,000 feet.

Electric current to be cut off from unused parts of mines.

(c) Electric current, by means of cut-out switches, shall be cut off from districts of the mine when men are not working in such districts, and wires permanently disused shall be disconnected from the source of current.

Details of installation.

SEC. 68. Specific details regarding the installation of electrical apparatus shall be in accordance with the published recommendations of the United States Bureau of Mines at the time of the issuance of these regulations.

Man in charge of electrical equipment shall be properly qualified.

SEC. 69. At a mine where electricity is used underground for power purposes, the lessee shall appoint a man to be in charge of the electrical equipment who is fitted for his position by ability, training, and experience. The character of the equipment will determine the qualifications of the mine electrician and he shall be thoroughly familiar with the operation and maintenance of the equipment in his charge.

Precautions in approaching oil or gas wells.

SEC. 70. When mining operations approach oil or gas wells or bore holes which may contain gas under pressure, the lessee shall present his plans of mining the coal in proximity to such holes to the mining supervisor for approval. The plans shall provide that the coal be extracted as completely as practicable with safety and in such manner that the well be not damaged, and that precautions be used against sudden liberations of a body of gas or oil or accumulations of liberated gases; the mine ventilation shall be so arranged that any gas liberated shall enter the return air current and not be circulated through the active workings of the mine.

Locomotives or other internal combustion engines, pumps, hoists, etc., in mines.

SEC. 71. (a) Locomotives and other internal-combustion engines, pumps, hoists, and other machines shall not be used in a gaseous mine or district, and may only be used in tunnels, drifts, and entries where the air current is sufficient to dilute and render harmless the exhaust gases, and to this end the percentage of carbon monoxide given off by the exhaust shall not exceed two one-hundredths of 1 per cent of the air current. The air returning from the haulage road of the locomotive and other internal-combustion engines shall not be circulated through the active working places.

Exhaust of gasoline engines.

(b) Where the exhaust of a stationary internal-combustion engine can be piped to the surface, this will be considered an adequate provision permitting the use of such engine, if in other respects the installation is properly made with regard to prevention of fire or explosion resulting from the use of the engine.

Transportation of gasoline underground.

(c) Gasoline or other highly inflammable oil used in the internal-combustion engines when taken into the mine must be in tight containers to replace the empty containers of the respective locomotive or engine, and in no

event shall such inflammable liquid be poured from one container into another in the mine.

Method of handling hay underground.

SEC. 72. (a) Hay, straw, or similar highly inflammable material taken into a mine shall be in compressed bales or covered with tarpaulin or in a closed car and shall not be handled when unbaled in the presence of open lights.

Storage of hay underground limited to 48 hours.

(b) Hay sent into a mine shall be promptly delivered to the stable and stored in a locked compartment with fire-proof lining and door. The amount of hay stored underground at any time shall not exceed the amount normally consumed in 48 hours, except that when public holidays occur together sufficient supply may be stored to last over same.

Exceptions.

Lubricating oil taken into and stored in mine.

SEC. 73. (a) Not more than one barrel or tank holding 52 gallons or less of lubricating oil shall be taken inside of any mine at any one time, and there shall be not exceeding two barrels of oil in the mine at one time.

(b) Such lubricating oil shall be kept in a recess or chamber in which there is no exposed inflammable material, such as timber or coal, and which has a cement floor; such chamber shall be provided with a self-closing iron or steel door set in an iron, concrete, or masonry wall, and said chamber shall not be located within 100 feet of any shaft.

Fire prevention precautions.

(c) Buckets or drip pans shall be used for catching the drip or leakage from the oil barrels or tanks. A supply of sand shall be kept in a suitable container located not in the chamber but near by for use in case of fire.

Prevention of coal-dust explosions.

SEC. 74. (a) To lessen the danger of coal-dust explosions in every mine producing dust of an explosive character, unless the floor, roof, and sides of the roads are naturally wet, arrangements shall be made and methods adopted, as follows:

Inclosing downcast shaft within 100 feet of screens.

(b) When the coal in screening and loading on the surface produces much dust and there is a downcast shaft within 100 feet of the screens and loading chutes, the top of the downcast shaft shall be surrounded by iron sheeting or other noncombustible material for a height up to the level of the upper landing.

Prevention of dust accumulation.

(c) Mine cars shall be constructed and maintained as tight as possible and loaded in a way to prevent coal or coal dust from escaping from the cars while in transit. Tight-end cars employed in connection with rotary dumps shall be used where practicable; otherwise, tight-fitting doors or gates shall be employed;

(d) The floor, roof, and sides of haulage entries shall be systematically cleaned to prevent, as far as practicable, coal-dust accumulations;

Application of water or noninflammable dust required.

(e) In mines and parts of mines which make or may make dust of explosive character, as may be determined by samples gathered by the mining supervisor and tested by the United States Bureau of Mines and that are not naturally wet, the systematic and regular application of

water, or rock, or shale dust shall be made to render the coal dust inert;

(f) If water is used, the dust must be made wet or washed down from the floor and ribs, and the floor dust must be so wet that it can not be raised into the air by concussion.

(g) If the dry rock dusting method is used, there shall be sufficient rock, shale, or other inert dust added and distributed systematically along the entries, slopes, tunnels, and escape ways so that the mixture will not be explosive when brought up in suspension in the air; to this end, the ash content of the mixture shall be determined, from time to time, by sampling and analysis by the lessee in accordance with the prescribed methods of the United States Bureau of Mines. The ash content plus the moisture shall not be less than 75 per cent or the rock dusting must be renewed in that portion of the mine where the deficiency is thus indicated.

Determination of explosibility of dust by analysis.

(h) In all dry districts or panels of mines not naturally wet throughout, rock dust or shale dust barriers of a kind specified or approved by United States Bureau of Mines shall be erected and maintained at the entrance of such district or panels and in all connections to an adjoining mine.

Rock-dust barriers at entrances to panels or sections of a mine and in connection with adjoining mines.

Sec. 75 (a). A lessee may develop a mine on his leased tract from an adjoining mine not on the public domain, or from adjacent leased lands, under the following conditions:

Mines may be developed on leased tract through an adjoining mine.

(b) If the mine not on the public domain conforms to all the sections in these regulations that relate to the safety of the mine and its employees;

(c) The only connections between the mines shall be the main haulage road, the ventilation entries, and the escape ways; that is to say, there shall be no unnecessary connections through the boundary barrier pillars between the mines. These barrier pillars shall not be extracted until both mines are about to be exhausted and abandoned unless with the consent of the mining supervisor;

(d) There shall be rock-dust barriers placed in the connecting passageways through the boundary barrier pillars in accordance with the preceding subsection 74h;

(e) Ample ventilation shall be maintained in both mines in accordance with previous sections.

(f) Free access for inspection shall be given at all reasonable hours to the mining supervisor or other representative of the Secretary of the Interior in said connecting mine not on the public domain.

(g) The orders in writing of the mining supervisor in accordance with the terms of these regulations shall be obeyed with the penalty, in case of violation, of suspending the operation of the mine on the leased land.

Timber and supplies furnished as needed.

Sec. 76. It shall be the duty of the lessee to provide whenever needed at or near the place where needed for use such timber and other material and supplies as are

necessary to the proper and safe conduct of the operation of the mine.

Location of explosives magazine.

Sec. 77. (a) All explosives except those for immediate use in the mines as specified hereafter shall be kept in surface magazines, which shall be located away from active or used mine openings, buildings, dwellings, and places where persons congregate, at distances proportionate to the quantity of explosives as specified by the United States Bureau of Mines; where the locality is mountainous, modifications of such distances may be made with the written approval of the mining supervisor, if the natural barriers justify.

Underground explosive magazines not to be connected with mine workings.

(b) A suitable dry underground chamber with wood lining and flooring so constructed and maintained that there will be no exposed nails, may, with the written approval of the mining supervisor, be used in place of a surface magazine if adequately ventilated and with sufficient cover, surrounding pillars, and strong bulkheads not to be dislodged in a manner to endanger a mine, building, or dwelling. The surface entrance to such magazine and the ventilating ducts shall be guarded by fences, gates, and the appropriate warning signs. In no case shall the magazine have any connection with any part of a mine in which men work. When the entrance to the magazine is a drift or slope which points toward any active or used mine opening or toward any building or highway, coming within a distance specified in the table of distances for the quantity of explosives stored, an earth barricade shall be erected opposite to and as high as the entrance.

Detonators in separate magazines.

(c) Detonators or blasting caps shall not be stored with other explosives but in separate magazines.

(d) All such magazines shall be under the charge of a competent person or persons designated by the lessee or his agent and kept securely locked except when said authorized person or persons are on duty at their respective magazines.

Magazines constructed in accordance with the Bureau of Mines specifications.

(e) All storage magazines shall be constructed and maintained in accordance with the published specifications of the United States Bureau of Mines at the time of approval of these regulations.

Thawing explosives, location of thawing house.

Sec. 78. (a) Thawing shall not be conducted in explosive storage magazines and a thawing house, where necessary, shall be located not less than 250 feet away from explosive storage magazines and at least 300 feet away from any mine opening or structure, but otherwise located in accordance with subsection 77a. Thawing must be done in accordance with published recommendations of the United States Bureau of Mines.

Explosives shall not be thawed or stored except as above specified.

(b) Explosives of whatever character shall not be thawed, kept, or stored in dwellings or other buildings on leased lands, except in the magazine and storehouses designated by the lessee and in accordance with these regulations.

Explosives sent into mine to be distributed promptly.

SEC. 79. In mines where the explosive is distributed to the miners underground, the distribution shall be done as soon as the explosive is taken into the mine, and in the manner set forth in section 84.

Temporary storage of explosives underground.

SEC. 80. In mines where explosives for any blasting operation are handled and the holes charged by the foreman or designated shot firers and it is necessary temporarily to store explosives, this storage shall be done in suitable magazines made in the solid coal or rock at least 300 feet distant from any shaft or main slope or 50 feet from any traveling way or intake airway, and shall be provided with a strong door which shall be kept securely locked except when entered by the person or persons authorized to enter the magazine. Not over 200 pounds of explosives shall be placed in any one magazine. Such magazine shall be cleaned before putting in each fresh supply of explosives. Explosives in excess of 24-hours' supply shall not be taken into a mine and stored in a magazine in excess of the expected 24-hours' requirement, including any surplus remaining from the previous day.

Amounts of explosives permitted in possession of miners.

SEC. 81. In mines where the miners charge their own blasting holes, not more than 10 pounds of black powder or in lieu of black powder not more than 6 pounds of permissibles or other high explosives may be in possession of any one miner, if as much powder or permissible or high explosive is permitted to be in his possession by the respective State laws, and not more than twice the respective amounts may be in possession of two or more miners who are working in the same place.

Miners to keep explosives in tight wooden box.

SEC. 82. The lessee shall require the miner, or miners, working in the same working places to keep the powder and high explosives or permissible explosives in portable tight wooden boxes, each having a lid which laps over the sides of the box and is strongly hinged or has battens that engage under a strip securely fastened at the back edge of the box. Battens shall be placed over all cracks so that the explosive may be protected from sparks, flame, and water. Fuse and cartridge paper may be stored with the explosives. No detonating or blasting caps, and no tools or pieces of metal, matches, or oily material shall be kept in the powder or explosives box. The powder box shall be placed in a crosscut or recess at such distance from the working face that there will be no danger of its being struck by flying pieces of coal or rock or from ignition by blown-out shots.

Blasting caps to be kept separately from explosives.

SEC. 83. Blasting caps or detonators shall be taken into the mine in separate containers from other explosives, and shall be transported and kept in an adequate moisture-proof container. Where miners are permitted to charge their drill holes, said container shall be placed in a hole or recess in the rib at least 20 feet away from the

point where other explosives are kept and where there is no danger of being struck by flying missiles from blasting or from a fall of roof.

Receiving and transporting explosives in bulk.

SEC. 84. (a) In mines or parts of mines in which electricity is used as a source of power, when the power circuit is not completely cut off while taking explosives in quantity for further distribution into a mine, these explosives shall be transported only in a closed powder car or box constructed of electrically nonconducting material, and with no bolts or nails exposed on the inside of the container; and no persons other than explosives distributors and men necessary to operate the trip shall ride in or on such trip carrying explosives in bulk.

Miners carrying supply. Explosives distributed to miners in nonmetallic containers.

(b) The lessee may permit men to carry their individual supplies of explosives into the mine, provided the explosive and detonators are being carried in separate nonconducting covered containers.

(c) The lessee shall permit only authorized persons to issue explosives to miners, and explosives shall be issued only in fiber or electrically nonconducting containers to miners as they enter the mine or to them at underground distributing points. No smoking shall be permitted by men engaged in transporting explosives or by any one in the vicinity of explosives being transported or stored.

Electricity power lines cut off in transporting explosives in bulk.

SEC. 85. In mines where electricity is not used as a source of power or in mines electrically equipped, if the electric current is cut off from other than properly installed lighting circuits when explosives are being transported, explosives in bulk may be taken into the mine in an ordinary mine car when propelled by man, animal, or cable.

Permissible explosives required in gaseous mines.

SEC. 86. (a) In any mine or part of a mine that by these regulations is termed gaseous, no explosive shall be employed other than permissible explosive, and this shall be used with due regard to the requirements for permissibility specified by the United States Bureau of Mines schedule of tests.

Shots shall be fired only after examination for gas.

(b) In gaseous mines a shot shall be fired only after tests with a miner's permissible safety lamp or an equivalent approved by the mining supervisor have determined that less than 2 per cent of inflammable gas is present and inspection has been made showing that there is no accumulation of dry inflammable coal dust adjacent to the drill hole: *Provided*,

Alternative electric firing from surface.

(c) That other explosives than permissible explosives may be used in a gaseous mine or district until such time as they prove dangerous to life and property, if the shots are fired electrically from the surface when all persons are out of the mine. The electric firing circuit shall be installed and maintained in accordance with published recommendations of the United States Bureau of Mines.

Nonpermissible explosives may be used in nongaseous mines under certain conditions.

SEC. 87. In a nongaseous mine or part of mine that by these regulations is termed nongaseous, black powder or other nonpermissible explosive may be used for blasting until there may occur an explosion of gas or coal dust originating from the blast as determined by the mining supervisor or district mining supervisor: *Provided*, The shots shall be fired only after inspection by authorized persons and fired electrically from the surface when no one is in the mine; or fired by shot firers appointed by the lessee when all other persons except the shot firers and officials authorized by the lessee are out of the mine: *And further provided*, The charge in any hole shall not be more than 5 pounds of black powder or equivalent of other explosive: *And further provided*, No shot shall be fired by shot firers or electrically from the surface if in the opinion of the shot examiners or shot firers it would be a shot likely to blow out.

Depth of drill holes in coal.

SEC. 88. Holes drilled in coal for explosives shall not exceed 4 feet in depth, unless the coal is of greater thickness than 4 feet, in which case the hole shall be of a length or depth not greater than the thickness of the coal that is being removed, except when the coal is undercut or sheared, the length or depth of the hole may be greater but shall be less by 6 inches than the depth of the undercutting or shear. No holes underground shall be charged and fired when the burden of the shot is too great; that is, if the distance from the inner end of the hole measured at right angles to the axis of the hole does not reach a free face within a distance of 5 feet in "shooting off the solid," or 6 feet where the face has been completely undercut or sheared.

No hole shall be charged and fired of which the burden is too great.

Drill holes stemmed with noncombustible.

SEC. 89. All shots that are charged with an explosive shall be "stemmed" with noncombustible material and "tamped" by the use of a wooden bar and said stemming or tamped material, after the tamping is completed, shall extend to the outer end of the hole.

Making up charge.

SEC. 90 (a). When black powder or other bulk explosives are to be used, the necessary charge or charges shall be made up at or near the box where the explosive is kept.

No open light within 5 feet.

(b) No open light shall be permitted within 5 feet of any powder box while an explosive is being obtained therefrom and during the process of filling or preparing the charge or cartridges.

Kegs shall not be opened by punching a hole in container.

(c) Kegs of powder shall not be opened by punching a hole in the container either by iron or wood tools, but the opening provided by the manufacturer shall be used for pouring out the powder.

Daily record to be kept of misfires.

SEC. 91. The lessee shall cause to be kept a written daily record of all shots misfired and of mine fires that result from blasting or from any other cause, which shall be kept in the office at or near the mine; and a list of all misfires, giving their location, shall be posted at the main entrance of the mine before the next succeeding shift.

Mining operations to be energetically prosecuted.

SEC. 92. (a) The lessee shall diligently prospect for, develop, and mine the coal in or upon the leased lands; shall carry on all mining or stripping operations in good and workmanlike manner, having due regard to the health and safety of miners and other employees as specified herein; and shall leave no available coal abandoned which could be recovered by the most approved methods of mining when in the regular course of mining operations the time shall arrive for mining such coal. No entry, level, or panel workings of which the pillars have not been completely extracted shall be permanently abandoned and rendered inaccessible, save with the written approval of the district supervisor or mining supervisor.

Workings not to be abandoned save with written approval.

Survey and map of mine areas before abandoned.

(b) The lessee, whenever any mine or any section of workings therein is to be abandoned or indefinitely closed and before same shall be abandoned or closed, or allowed to become inaccessible, shall cause to be made a survey thereof to show accurately the worked-out areas, and shall extend the results of such survey on the map or maps of the underground workings hereinbefore required, and shall promptly forward blue prints or reproductions thereof in duplicate to the district mining supervisor.

Outcrop coal on dipping beds shall not be stripped unless natural drainage away from pit.

SEC. 93. Stripping or surface mining pits shall not be permitted in the outcrop of dipping coal beds where the topography of the surface with relation to the pit will not allow self-drainage or drainage through ditches or adits from the face of the pit to prevent seepage underground then or thereafter, until the workable coal lower in the elevation in that bed and underlying beds shall have been extracted in compliance with the terms of the regulations and lease.

Where two or more beds of coal are present, pillars in lower beds are to be left until coal in upper beds is extracted.

SEC. 94. (a) The lessee where more than one bed of coal is known to exist in the leased lands, shall not draw or remove the pillar in any lower bed before mining the available coal in each known upper bed of such thickness that it can be mined under the then existing commercial conditions either alone or in combination with the thicker beds, unless it shall be decided by the mining supervisor that the workings or conditions for subsequent mining in any or all of the upper beds will not be seriously injured by the extraction of the pillar coal in the lower workings.

Exceptions.

Pillar in one bed to be arranged vertical ly under or over pillars in another bed.

(b) Where mining operations are in a bed that lies either below or above another bed in which mining has been or is being carried on, and where the vertical distance between the two beds is less than fifteen times the thickness of the lower of the two beds, as far as practicable the lessee shall, if the room and pillar system is employed, so arrange the pillars of room and panel pillars that those in the lower bed shall be vertically beneath those in the upper bed or vice versa; modifications of this provision may be necessary in steeply dipping beds. Where the long-wall method is employed and the goave or excavation prope ly packed, this provision is void.

Where practicable an upper bed worked first or in advance of ower bed.

(c) Where practicable, by reason of either commercial or mining conditions, the available coal in the upper beds shall be worked out before the coal in the lower beds is mined, otherwise the workings in the upper coal bed shall be kept in advance of the workings in each lower bed.

Limitations of coal to be removed in advance workings under "room-and-pillar" system.

SEC. 95. Where the "room-and-pillar" or any other system of mining is adopted by the lessee which requires advance workings in the solid coal, including entries, crosscuts or break-throughs, and rooms, the lessee shall not, without the consent in writing of the mining supervisor being obtained, extract by such advance workings or first mining, more than the following percentage of the total area of coal bed within any particular tract of one or more acres to be entered by said advance workings for the specified depths of cover, viz, not more than 60 per cent when the cover is less than 500 feet; not more than 50 per cent when a cover is over 500 feet and less than 1,000 feet; not more than 40 per cent when the cover is over 1,000 and less than 1,500 feet; not more than 30 per cent when the cover is over 1,500 and less than 2,000 feet; and not more than 20 per cent when the cover is over 2,000 feet. In figuring the percentages for advance extraction or first mining of the total area of the tract under consideration, the areas mined and unmined may be compared and figured on the basis of the respective surveyed areas as shown on a map or plan and not on the basis of the calculated tonnages of the workings and bed. The total area of the tract under consideration is to be comprised within lines bounding the faces of advance workings within the respective tract, and, when the dip of the bed is more than 45°, the comparison may be made and percentage figured by means of a projection on a vertical plane or by a projection on the plane of the bed. In figuring the area of advance extraction or first mining, the area extracted from pillars within the tract under consideration, if pillar drawing is systematically carried on, shall not be included, as it is intended, except where the retention of pillars is necessary for protection of shafts, the maintenance of main roads or passageways, or for the protection of overlying coal beds or important surface structures, that all pillars shall be mined and removed as rapidly as proper mining will permit.

Computing term "percentage of area extracted."

Pillars to be removed as rapidly as possible.

Not more than 5 men to be employed in new workings unless second egress provided.

SEC. 96. The lessee shall not employ more than five men underground on any one shift in any drift, level, entry, slope, room, or working of any mine, unless such working place shall be so connected with an adjacent working place, slope, or tunnel as to provide within a distance of 200 feet of the face of the breast a second means of egress; except that, with the written approval of the mining supervisor, not exceeding 10 men on any shift may be employed to make such second means of egress, provided adequate ventilation is obtained by large pipes or ducts, or by brattices or partitions; but in no case shall any rooms, entries, tunnels, or branches be

Exceptions. 10 men driving to make connection, when approved.

turned or worked off the single place being driven until such second means of egress is obtained; except that crosscuts may be driven off connection to a parallel passage as provided in section 18d and stubs for turnouts or switches not over 10 feet long from the side of an entry, tunnel, or slope may be made.

Shall not work branches while driving for connection.

Pillars for support of shafts, slopes, and drifts.

SEC. 97. (a) There shall be left in each coal bed being mined, for the support of each shaft, main slope, or egress, a pillar of size proportionate to the depth of the coal bed below the surface and the thickness of coal being excavated in the respective bed. The minimum diameter of the pillar in each bed being mined shall be equal to the height of the surface egress above the lowest point of the pillar in the respective bed, this ratio being modified by the surrounding natural conditions such as dip of bed, strength of coal, and rock material. Similarly each point in a slope shall have the support of a pillar of a width on either side of the center line of the slope equal to one-half of the height of the cover above the respective edge of the pillar. Shaft and slope pillars shall not be less than 100 feet in width.

Minimum diameter of pillar in general equal to depth below surface.

Landings and passages in shaft and slope pillars.

(b) Shaft and slope landings, sidings, entries for haulage, ventilation, manways, and stables may be excavated in the pillar if timbered or lined in a permanent manner and if the area of such places does not exceed 20 per cent of the area of the pillar, but no rooms or wide working places shall be driven for the above purposes.

Extraction of shaft and slope pillars.

(c) The pillars specified in the preceding section above may be extracted as the time of exhaustion of the mine approaches, or prior to this time if replaced by tight packing as approved by the mining supervisor in writing.

Fifty-foot barrier pillars.

SEC. 98. The lessee shall not, without the consent of the district mining supervisor first had and obtained, mine any coal, drive any underground working, or drill any lateral bore hole within 50 feet of any of the outside boundary lines of the leased lands, nor within such greater distance of such boundary lines as the district mining supervisor shall prescribe, for the protection of this or adjoining property or the safeguarding of mining operations hereunder from inundation of water or gas; but in the event the coal up to the like barrier on an adjoining leased tract on the public domain shall have been worked out and exhausted, and the water therein shall have been lowered below the working level of the operations on the same bed on the lands covered by the lease, the lessee shall, upon the written demand of the mining supervisor, mine out and remove all the available coal in such barrier both in the lands covered by the lease and on the adjoining premises whenever same can be mined without hardship to lessee, provided, where the coal mining rights in such adjoining premises are not owned by the lessor, an agreement may be made

Lessee may be required to mine barrier pillars on adjacent lands.

by the lessor with the owner of the adjoining coal and the lessee of the coal, if any.

Unattended open lights and fires for heating prohibited.

SEC. 99. The lessee shall not, save as hereinafter authorized, light, keep, or maintain any fire for heating or unattended open light in any stripping, except as approved by the district mining supervisor, or underground in any mine, in contact with the coal in place, or in or along the outcrop of any coal bed. Failure to take prompt and vigorous steps for the extinguishment of any such fire shall be sufficient ground for the entry of the lessor to remedy said condition.

Water supply for fire fighting in mines where over 10 men are employed.

Water barrels in mine.

SEC. 100. (a) In every mine in which over 10 men are underground on any one shift, there shall be a supply of water on the surface available for fighting fires in and about the mine. If this supply of water is not furnished through pipes, hydrants, and hose, it shall be kept in barrels of about 50 gallons capacity, painted red, with covers, and a 2-gallon bucket or can, painted red and marked, "Do not use except for fighting fire," shall be hung or placed immediately adjacent to each barrel. These barrels shall be maintained full of water. Barrels in a mine where pipe lines and hose have not been installed shall be placed near the bottom of each shaft or slope and at principal junction points not exceeding 1,000 feet apart on a main haulage road. Provision shall be made to keep the water in barrels or pipe lines from freezing. Chemical fire extinguishers having a capacity of not less than 2 gallons may be substituted for barrels of water.

Installation of water supply for fighting fires in mines employing over 200 men underground.

(b) In every mine in which over 200 men are employed underground on any shift, and in which a sufficient water supply is securable, by moderate expenditure, within 1 mile of a mine shaft or slope, the mining supervisor may require, if the conditions at the mine in his judgment make it advisable, the installation of a pumping system, tank or reservoir, pipe lines, fire hydrants and hose, and a pipe line into the mine, not less than 2 inches in diameter and extending at least 500 feet on either side of the main hoisting shaft or slope to the first working levels, with suitable attachments for hose not over 100 feet apart and with at least three 50-foot lengths of 1½-inch hose with standard pipe thread connections and nozzles at appropriate points for immediate use. Such pipe lines shall be so located and installed that water will not become frozen. Pressure-reducing valves or equivalent shall be so placed that the pressure will not exceed 50 pounds per square inch at the hydrant or point of attachment of the hose. In any mine where such pipe lines and hose are installed and maintained, barrels filled with water as specified under section 100 will not be required within the areas reached by such pipe lines, provided there is an adequate supply of water for emergency fire fighting to which the water pipes are connected. Pipe lines of a water sprinkling or drainage system which are connected with a sump con-

Pipe line and hose in mine for fire protection.

50-pound pressure limit on water lines for hose.

taining over 5,000 gallons of water fulfill the requirements of water supply and pipe lines underground if provided with taps, valves, and hose.

Manways not used for haulage provided as far as practicable.

SEC. 101. The lessee shall arrange, as far as practicable, manway passages free from regular haulage for the passage of underground employees to and from their working places. Such manways shall be maintained in good order and free from loose coal and rock, and signs with arrows shall be provided showing direction toward the escapeways on either side of crossing or intersecting passages. The lessee shall require the employees to use the manways as far as practicable in going to and from their working places.

Shelter holes on haulage roads.

SEC. 102. (a) In any mine in which more than 10 men are employed underground on any shift, all entries, tunnels, and slopes used both for the travel of men and for haulage shall be provided with shelter holes on one side of the roadway at intervals of not exceeding 60 feet; the shelter holes shall be at least 4 feet wide, 4 feet deep, and 6 feet high, unless the entry, tunnel, or slope be of less height, when they shall be of the same height and level with the road, and shall be kept whitewashed and free from débris.

(b) Where the clearance between the mine car and rib at such intervals is as much as 4 feet, the shelter hole shall not be required, provided the rib at such intervals is kept whitewashed and free from débris.

(c) On haulage roads not used as traveling ways, shelter holes will not be required provided there is a clearance between the mine car and the rib of the entry of at least 3 feet. Shelter holes shall be on the opposite side of the road from the trolley and power wire.

Crosscuts and room necks may serve as shelter holes.

(d) Where there are crosscuts at intervals of not over 75 feet or in entries off which rooms are turned not more than 75 feet apart, the mouths or necks of the crosscuts or the rooms when maintained as above provided, may serve as shelter holes.

Stop blocks or derails at top of slopes or inclines.

SEC. 103. (a) At the top of any slope or incline used for haulage, there shall be an automatic stop block or a spring derail which will stop or derail cars, except when held open by an attendant by means of a lever or other appliance while cars are passing under control.

Switch-lever arrangement.

(b) Switch levers must be installed to avoid the danger of men tripping over them.

Frogs and guard rails properly blocked.

(c) Frogs and guard rails shall be properly blocked.

Safety catches or safety man car on slopes.

(d) When hauling men on slopes and inclines, safety catches, or a special man car giving equivalent result, shall be installed when practicable; otherwise when hauling men on slopes or inclines, safety hitching rope or chain of ample strength shall be employed, extending from the rear car to the main hoisting rope.

Connections with adjacent mines, stopped up or if open, may be closed by emergency doors.

SEC. 104. (a) All connections with adjacent mines, if not used for haulage escapeway exits or airways, shall be sealed with stoppings which shall be fireproof and be built to withstand a pressure of 50 pounds per square

inch on either side, calculated by a formula or method approved by the United States Bureau of Standards.

Fire doors in mine connections.

(b) There shall be installed in any open connections substantial iron or concrete fire doors, set in substantial fireproof frames, which may be closed in an emergency by authorized officials but which may be reopened from either side to permit the escape of men who may be trapped behind them in case of fire or explosions. Such doors shall be installed in duplicate, and the distance between doors shall be at least 40 feet.

Slack and refuse to be disposed of so as not to become a public or private nuisance.

SEC. 105. (a) The lessee shall make such provisions for the disposal of waste, slack, and refuse of the mine, or waste, or sludge of any washery, that the same shall not be a nuisance or obstruction to any stream, right of way, or other means of transportation or travel, or to any private or public lands, or to any adjoining lands or in any manner to occasion private or public damage or inconvenience.

Deposit separately unmarketable coal and waste.

(b) All waste containing practically no coal shall be deposited separate and apart from coal for which there is no immediate market, and from the waste containing coal in such proportion that it may be later separated by washing or other means.

Abandoned surface openings to be covered, filled in, or fenced.

SEC. 106. The lessee shall during the term of the lease and before abandonment substantially fence, fill in, cover, or close all surface openings, subsidence holes or workings where persons or animals are likely to be injured by falling therein, or be endangered by accumulation of gas, and shall maintain all such fencing or covering in a secure condition during the term of the lease.

Bath and change house requirements.

SEC. 107. At any mine or stripping in which more than 25 men are employed on any shift, the lessee shall provide a substantial change house or room convenient to the mine exit or stripping pit, adequate for the number of employees that request the use of same, heated in winter and with lavatory and sanitary bathing arrangements, such as showers or tubs with ample supply of hot and cold water of proper quality, proper drains and sewage disposal, and sanitary lockers and hangers: *Provided*, That at mines where it is not possible at reasonable expense to secure ample supply of water, tubs for bathing purposes will suffice, provided each employee is furnished at least 5 gallons of water per shift worked until such time as sufficient water can be obtained at a reasonable expenditure.

Dwellings for employees shall be kept in sanitary condition.

SEC. 108. (a) A lessee employing 25 or more men in mines and stripping operations shall provide adequate quarters or places of abode within 2 miles of the mine unless transportation is available from a town or village. Dwellings built on the leased land shall be properly located with reference to sanitary conditions and an adequate supply of pure water shall be provided in proximity to each dwelling.

(b) Facilities shall be provided for the regular collection and disposal in a sanitary manner of garbage and

trash and a separate toilet or privy shall be installed for each dwelling, and at least two in the vicinity of the mine entrance.

(c) Unlined pits for privies may only be constructed or thereafter used where and when there are no wells or openings furnishing water for drinking or domestic use within such distance, or the source of water is in such location that there is any danger of contamination of the water. Where privies unconnected with a sewage system are used, openings must be screened from flies.

Inspection of sanitary conditions in mine camp by the lessee.

(d) It shall be the duty of the lessee to have an inspection made weekly, by a competent representative, of toilets, privies, sewage, and garbage-disposal systems on the lease and promptly to correct or require to be corrected defects and insanitary practices. The recommendations of the United States Public Health Service as given in their publications shall be followed in all such matters.

School facilities for children of employees.

SEC. 109. When there is no public school maintained within 2 miles of the village on any lease on which men with children of school age are employed by the lessee, he shall endeavor to secure the establishment of a public school, and until such school is provided by the local or State authorities, he shall provide, if there are more than 10 children to be instructed, a temporary school room or rooms, and shall endeavor to arrange for the employment of a school teacher or school teachers by subscription or otherwise.

First-aid box or supplies.

SEC. 110. At every working mine or stripping on a lease there shall be provided a United States Bureau of Mines standard first-aid box and its equipment, or its equivalent, kept at a convenient place for emergency use.

First-aid receiving room near exit of mine or stripping with first-aid equipment.

SEC. 111. On any leased land or mines in which more than 25 men are employed, the lessee shall provide for emergency first-aid treatment of injuries near the main exit of the mine or stripping operation, including a first-aid room or receiving station for injured persons arranged with heating facilities for cold weather, which shall be equipped with a United States Bureau of Mines standard first-aid box or cabinet or equivalent, several pairs of splints, a Bureau of Mines resuscitation apparatus or equivalent with its oxygen bottle kept filled; and there shall always be on hand at least one fully charged oxygen tank, two stretchers or hospital cots, four pairs of clean blankets in oilcloth bags, and if pure water is not immediately available, a sealed keg of pure drinking water renewed weekly, a basin, and suitable toilet facilities kept in a sanitary condition.

First-aid and refuge chamber near shaft or slope bottom.

SEC. 112. (a) The lessee shall also provide for every separate mine in which more than 25 men are employed underground on any shift a refuge and first-aid chamber underground either near the foot of one of the shafts, if any, or at whatever point injured persons would most

likely be taken to await opportunity to be hoisted or transported to the surface.

In case of a mine on a dipping bed, with one or more landings, this point shall be on the landing which serves the largest group of men. In the case of a drift mine, the location shall be at a suitable point, such as the junction of the principal branch haulage ways.

(b) The refuge and first-aid chamber shall be not less than 6½ feet high, 8 feet wide in the clear, and 20 feet long, kept whitewashed and free from dirt, and provided with a tight-fitting door. The first-aid room shall not be used for other than refuge or first-aid purposes nor entered otherwise except for inspection, repairs, and renewals.

First-aid equipment underground.

(c) Said chamber shall be equipped with a first-aid box or cabinet or equivalent, Bureau of Mines resuscitation apparatus or equivalent, with oxygen bottle kept filled, splints, two stretchers, four pairs of clean blankets in oilcloth bags, a sealed keg of pure drinking water renewed weekly, a basin, a bucket, portable fire extinguishers having a total of 10 gallons capacity, a 10-yard roll of clean brattice cloth, and a keg of nails, and a copy of the latest mine map shall be fastened on a side of the chamber. Where practicable the foreman's office shall be placed immediately adjacent to the refuge and first-aid room so the latter may be under supervision.

Fire-fighting or explosion emergency supplies underground.

First-aid training.

SEC. 113. At every mine or stripping in which more than 25 men are employed on any shift, the lessee shall require his mine officials to be trained in first-aid methods when the United States Bureau of Mines can furnish instructors to give such training, and shall provide facilities and encourage the training of any or all employees in first-aid methods.

Reporting accidents to mining supervisor.

SEC. 114. A report in writing shall be made of each accident that results in the loss of more than one shift for the injured person. These reports, giving name, age, and occupation of injured person, the date, name of mine, and place, with outline sketches or maps when pertinent, the cause, actual work being performed when injured, nature or result of injury, and probable length of disability, shall be made promptly to the district mining supervisor. Where reports embodying the above information are made to the respective State inspector or industrial commission, copies of such reports and outline sketches or maps will fulfill the requirements of this section.

Reporting contagious and occupational diseases.

SEC. 115. All contagious diseases in or about the lease, as well as cases of occupational disease known to the lessee which result from or are aggravated by the particular work, shall be reported to the district mining supervisor.

Reporting threatening danger in mines.

SEC. 116. The lessee shall report promptly to the district mining supervisor by telephone or telegraph the occurrence in or about the lease of fatal accidents, serious outbursts of gas, explosions, inundations, extensive squeezes or collapses of roof, or other serious conditions threatening the loss of life or property.

Engine-house and power-plant construction.

SEC. 117. At mines in which over 200 men are employed underground on any shift, the building or buildings containing the hoisting engine and power plant shall not have floors, ceilings, and side walls or roof constructed of combustible material, but may employ wood for side-wall studs or frames if covered on both sides by noncombustible material and may use wood for roof trusses, purlins, and rafters.

Fireproofing shafts.

SEC. 118. In every mine where there are or are designed to be employed more than 200 men underground on any shift, the main hoisting shaft, the ventilation shaft, and the second escape exit, if separate, shall, if the lining or stratum is combustible, be fireproofed within six months after completion, by lining, guniting, or coating with cement or other noncombustible material all combustible material except guides, ladderways, and stairways, and such fireproofing shall be maintained as long as said shafts form the principal means of egress.

Passageways adjacent to exits to be fireproofed

SEC. 119. In every mine where there are or are designed to be employed more than 200 men underground on any shift, the roof and walls of entries and passageways within 200 feet of the bottom of each of the two principal means egress shall, if lined or timbered with wood, have such wood fireproofed by coating with cement or equivalent within one year after said passageways have been driven, and such fireproofing shall be maintained so long as said passageways are used.

Medical and surgical service.

SEC. 120. On any leased land where over 50 men are employed, and where there is no available physician or surgeon whose headquarters is within such distance from the mine or stripping that the journey can be made within one hour's time, the lessee shall arrange for medical and surgical attendance for its employees, their families and dependents, on the lease at designated times.

Hospital to be established and maintained if nonexistent within 10 miles.

SEC. 121. (a) On any leased land on which more than 100 men are employed, if there is no State, county, city, or private hospital approved by the United States Public Health Service within 50 miles by railroad or within 15 miles by well-maintained private or public highways, and suitable ambulance is available, the lessee shall erect and equip and maintain a hospital at a convenient place on the lease, appropriate in size to the number of men employed and their families, in accordance with the recommendations of the United States Public Health Service;

Ambulance to be provided.

(b) Provide a suitable covered ambulance, promptly available for use on notice when the hospital is over one-half of a mile from the mine;

(c) Provide for medical and surgical service for the employees and their families, the employees paying on

any prearranged basis satisfactory to a majority of employees the actual cost of such service, but not more;

Nurses employed if requested by employees.

(d) Provide on the request of a majority of employees, nurses and attendants for surgical and medical treatment for employees injured in their work, treatment of occupational or miners' diseases known to the lessee, and the treatment of sickness or contagious diseases affecting the families or dependants of employees;

Hospital and medical and surgical service furnished employees at cost.

(e) The nursing, surgical, and medical service shall be furnished by the lessee to employees at cost, including salaries, wages, and supplies, but repairs and renewals of buildings and equipment shall be furnished by the lessee at cost plus an annual charge of not exceeding 10 per cent to cover interest on investment, losses and repairs, and amortization; such charges may be collected from employees as a condition of their employment fully understood and acknowledged: *Provided*,

Hospital service discontinued by lessee if other service available.

(f) That when a suitable hospital is erected within 15 miles by a good road as stated above, by State, county, city, town, or cooperative or private hospital, with adequate accommodations approved by the United States Public Health Service and available for the employees of the lessee, the lessee may be relieved of his obligation to maintain a separate hospital, but shall continue to furnish medical, surgical, and ambulance service at cost on request of the majority of the employees.

Mine-rescue apparatus (five sets) at mine where more than 100 men are employed underground.

SEC. 122. At every mine in which more than 100 persons are employed underground on any shift, the lessee shall have kept and maintained at the mine in order, ready for use, in an adequate room provided for the purpose, five sets of oxygen or self-contained breathing apparatus of a kind approved by the United States Bureau of Mines, with ample supply of appropriate absorption material and oxygen for at least 10 hours' service of the apparatus, together with the charging pump and repair supplies.

Five additional sets where more than 200 men employed underground.

SEC. 123. (a) When the number of persons employed underground on any shift exceeds 200, five additional sets of breathing apparatus with the corresponding additional supplies shall be kept and maintained.

Additional sets not required if cooperation effected with another operator or joint rescue station maintained.

(b) The said five additional sets of breathing apparatus specified in the preceding subsection will not be required if the lessee cooperates with a neighboring mine or industrial works in the establishment of a joint rescue station which shall be within a distance of one hour's journey by rail or vehicle from the mine on the leased land: *Provided*, That said joint station is connected by telephone line and has an equipment of five sets of breathing apparatus of a kind approved by the United States Bureau of Mines, and with adequate supplies for use in emergency: *And further provided*, That said joint station shall have a hand car or motor car for transporting by rail, if locomotive is not available, or shall have vehicle equipment for transporting by road, the apparatus and

supplies to the mine on the leased land within one hour's time of notice of disaster or threatened disaster.

Mine-rescue teams formed and trained.

SEC. 124. The lessee shall arrange, in cooperation with the United States Bureau of Mines, for the training of employees in methods of administering first aid to the injured and in the use of mine-rescue breathing apparatus, to the end that there shall be at least one team of five men, who may be mine officials, for every 100 men employed underground on any one shift. A team shall be selected from men who have been certified by the Bureau of Mines as competent in first aid and rescue work, which team shall be trained in wearing apparatus in a smoke or gas chamber for a total of at least two hours in every two months.

Where more than 300 men are employed underground a foreman of rescue and first aid to be employed.

SEC. 125. Where more than 300 men are employed underground on any shift, a foreman of rescue and first aid shall be employed who shall devote his working time to keeping rescue and first-aid equipment in condition for use and to training men in first-aid and rescue methods: *Provided*, That if a lessee joins with other mine operators or an association in maintaining a central or joint rescue station, as specified in section 123b, within one hour's journey by rail or vehicle, and said station is in charge of a foreman, no foreman of rescue and first aid shall be required at the mine.

Formation of a safety committee recommended.

SEC. 126. The lessee shall organize a safety committee at each mine or stripping in which more than 25 men are employed, composed of representatives of the lessor and of the employees, which committee shall hold monthly meetings to discuss and make recommendations relating to safety in the operation of the mine or stripping.

Lessee to keep true and accurate weights or measurements of coal mined and loaded by miners.

SEC. 127. (a) The lessee shall accurately weigh or measure and truly account for the coal mined and loaded by each miner where the miners are paid either by the weight of their output or upon the basis of the measurement of the coal; keep a correct record of all coal so weighed or measured; post or display such record daily for the inspection of the miners and other interested persons; and shall,

Weighman to take oath for faithful discharge of duties.

(b) Require the weighman or person appointed to weigh or measure the coal where the miners are paid upon the basis thereof, before entering upon his duties, to make and subscribe to an oath before some person duly authorized to administer oaths that he will accurately weigh or measure and keep true record of the coal so weighed or measured and credit same to the miner entitled thereto, such affidavit to be kept conspicuously posted at the place of weighing, if any.

Lessee may deduct weight of rock, bone, or clay loaded with coal.

(c) Nothing contained herein shall be construed to prevent the lessee, in case bone coal or other impurities are loaded by the miner with the coal, from estimating or separately weighing and deducting the amount thereof

from the weig'its of coal accredited to the miner or miners.

Lessee may contract with miners to measure coal by excavation made by removal of coal.

(d) In mines or working places when it is difficult or impossible on account of natural conditions to excavate the coal free from rock or other impurities, or in mines where weighing scales have not been installed, nothing herein shall be construed to prevent the lessee from entering into contract with the miner for miners to measure the coal mined and removed by measurement of the excavation thus made, or from contracting with the employee to pay on the basis of the feet or yards of advance of the working place.

Lessee may contract on yardage basis.

SEC. 128. The administration of these regulations shall be under the direction of the Bureau of Mines.

Approved, April 30, 1921.

ALBERT B. FALL,
Secretary.

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END OF
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